UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/729,261	12/05/2003	Robert R. Rice	000352-804	1178

26294 7590 08/21/2007

TAROLLI, SUNDHEIM, COVELL & TUMMINO L.L.P.
1300 EAST NINTH STREET, SUITE 1700
CLEVEVLAND, OH 44114

EXAMINER	
VAN ROY, TOD THOMAS	
ART UNIT	**PAPER NUMBER**
2828	

MAIL DATE	DELIVERY MODE
08/21/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/729,261	RICE ET AL.	
	Examiner	Art Unit	
	Tod T. Van Roy	2828	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 June 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The examiner acknowledges the amending of claim 11.

Response to Arguments

Applicant's arguments filed 06/06/2007 have been fully considered but they are not persuasive.

The following will comprise the Applicant's argument (*briefly*) and the Examiner's opinion.

Sasaoka teaches the fiber to have a Raman Gain coefficient of Gr/Aeff of .005, which would be uniform, and therefor not have a radially dependent value.

The Examiner agrees that Sasaoka teaches this value at [0026], but notes that this is the minimum value (.005 or more). If this is only a minimum value at each wavelength for a given area, it does not mean that the value is uniform across the diameter of the fiber.

The Sasaoka reference does not teach favoring lower order modes over higher order modes as the reference teaches a single mode fiber.

The Examiner agrees that Sasaoka teaches a single mode fiber, but motivates the use of a multimode fiber by incorporating Rice. Sasaoka's doping, plus Rice's multimode fiber, gives the mode discrimination function.

Sasaoka teaches radially doping for refractive index profile adjustment, but not for Raman gain profile adjustment.

The Examiner agrees that Sasaoka teaches the dopant profile (fig.1b) to be radially dependent and to be used to affect the refractive index. However, due to Sasaoka's use of Ge02, the dopant profile would also inherently adjust the Raman gain profile. The doping taught in fig.1b is radially dependent, and shows increased refractive index at the center point of the fiber. This indicates heavier doping at the center with radially decreasing amounts away from the center. The Raman profile would inherently follow this pattern as well.

The Examiner also notes [0006], [0016] (lines 1-7), and fig.2 of the Applicant's specification that teaches doping using Ge02 in the same basic pattern of Sasaoka resulting in the Raman gain profile.

Claim 2 requires two different dopants.

The Examiner does not agree. Claim 2 states that a transparent oxide must be present which affects the refractive index (Sasaoka teaches Ge02, fig.1b). The claim further states a dopant must be present that affects the Raman gain profile. The claim does not make clear that the transparent oxides cannot perform both functions. Therefor, Sasaoka's use of GeO2 fulfills the requirements of the claim.

The remainder of the presented arguments is largely directed to the points addressed above.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-5 and 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaoka et al. (US 2002/0135866) in view of Rice (US 6363087).

With respect to claim 1, Sasaoka teaches an optical fiber ([0011], taught to amplify a plurality of wavelength components) comprising: a core having a longitudinal optical axis (fig.1a #101) and incorporating radially dependent amounts of dopant materials ([0022], creating the refractive index profile seen in fig.1B) to provide a desired refractive index profile and a desired Raman gain coefficient profile that favors lower order modes and discriminates against higher order modes (would inherently allow higher Raman gain along the optical axis and promote lower order modes and discriminate against higher order modes- due to being single mode, and after combination with Rice the prior art fiber would have identical properties to the applicant's fiber), and a cladding region surrounding the core and having a refractive index different from that of the core material (fig.1a #102, fig.1b #151/152), wherein light launched into an end of the fiber is subject to higher Raman gain along the optical axis (due to doping profile), which promotes lower order modes and discriminates against higher order modes. Sasaoka does not teach the fiber to be multimode. Rice teaches a multimode Raman amplifying fiber (abs.) that is formed to allow propagation of lower order modes while discriminating against higher order modes (col.4 lines 20-26). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fiber of Sasaoka with the core and cladding sizing of Rice (col.4 lines 14-

36) in order to allow for increased amplification of the lowest order mode while enabling efficient pumping via multimode pump sources (col.4 lines 32-36).

With respect to claims 2-3, Sasaoka teaches the radially dependent index, gain, and doping profile outlined in claim 1, and additionally teaches the use of a transparent oxide ([0022] GeO2), and the refractive index and Raman gain coefficient have their highest values along the optical axis of the fiber (fig.1B, due to doping profile).

With respect to claim 4, Sasaoka teaches the refractive index profile and Raman gain coefficient profile both have a generally parabolic shape with a peak coinciding with the optical axis of the fiber (fig.1B, due to doping profile).

With respect to claim 5, Sasaoka teaches the dopant concentrations are selected to provide a measure of control over the refractive index profile and the Raman gain coefficient profile (inherent that the doping of the Silicon fiber would adjust the refractive index and Raman gain profile).

With respect to claims 12-13, Sasaoka teaches the optical fiber as defined in claim 1, wherein the doping profile comprises radially dependent amounts of dopant materials comprising a minimum amount of dopant material near an interface between the core and the cladding region with a gradual transition to a maximum amount at the optical axis (fig.1B, inherently providing for higher Raman gain along the optical axis).

Claims 6-9, 11, and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaoka and Rice in view of Clarkson (WO 02/50964 A2).

With respect to claims 6-7, Sasaoka and Rice teach the fiber as outlined in the rejection to claim 1 above, but do not teach a diode laser array providing pump power to the fiber, means for launching the pump power into the fiber, and reflective means defining a laser cavity. Clarkson teaches a fiber laser system (fig.8a) which includes a diode laser array providing pump power to the fiber (fig.8a #13), means for launching the pump power into the fiber (fig.8a #15), and reflective means defining a laser cavity (fig.8a #50, 55). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fiber of Sasaoka and Rice with the fiber laser system of Clarkson to pump the fiber gain medium and provide feedback allowing for generation of Raman amplification and oscillation of the laser signal for transmission.

With respect to claims 8-9, Sasaoka, Rice and Clarkson teach the fiber laser as outlined in the rejection to claim 6, and Clarkson additionally teaches a highly reflective mirror at one end (fig.8a #50, pg.19 lines 20-25), and a partially transmitting mirror at the other (fig.8a #55, pg.21 lines 18-21), including outputting an essentially collimated beam to the output mirror (pg.21 lines 3-5). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fiber laser of Sasaoka, Rice and Clarkson with the mirror reflectivities and lenses of Clarkson in order to allow for the oscillation of a given percentage of the light input into the fiber, to make use of the gain medium, as is well known in the art, as well as to properly spatially position the beam for coupling to any additional optics.

The method of claim 11 is rejected as being taught by Sasaoka, Rice and Clarkson as outlined in the rejection to claim 6.

With respect to claims 14-17, Sasaoka, Rice and Clarkson teach the fiber laser and method as outlined in the rejection to claims 6 and 11, wherein Sasaoka teaches a multimode input ([0011]), and the doping profile comprises radially dependent amounts of dopant materials comprising a minimum amount of dopant material near an interface between the core and the cladding region with a gradual transition to a maximum amount at the optical axis (fig.1B, inherently providing for higher Raman gain along the optical axis).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaoka, Rice, Clarkson, and further in view of Paldus et al. (US 2003/0161361).

With respect to claim 10, Sasaoka, Rice and Clarkson teach the fiber laser system as outlined in the rejection to claim 6, including the use of multiple lenses (Clarkson, pg.21 lines 6-7), but do not teach the use of a pinhole filter. Paldus teaches a laser system using a pinhole filter ([0071]). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the laser system of Sasaoka, Rice and Clarkson with the filter of Paldus in order to utilizing a bandpass method to spatially filter the output light.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVR

MINSUN OH HARVEY
PRIMARY EXAMINER